

REMARKS

Claims 1-3, 5-7, 9-13, 15-18, 20-28 and 52-55 were pending in the application prior to this amendment. Numerous grounds of objection and rejection were applied to the application in the office action, each of which is addressed below. As claims 3, 23-28, and 55 have been cancelled herein, the following remarks will be directed only to the currently pending claims 1-2, 5-7, 9-13, 15-18, 20-22, and 52-54 as well as newly added claims 56-65.

Objections to the Drawings

The examiner has objected to Figs. 2, 4-7, 10-13, 21, and 23 on the grounds that they only illustrate prior art and should be designated as such. The objections are respectfully traversed. Applicants do not believe that MPEP 608.02(g) applies to drawings which are intended to illustrate or explain the operation of an apparatus or system which applicants regard as their invention, either as presently claimed or as may be claimed in a subsequent application. Figs. 2 and 21 depict a particular representation of the vessels of the cerebral vasculature as modeled by applicants' claimed system and method. Figs. 4-7 and 10-13 illustrate the user interface and display of a computer system incorporating features which applicants regard as their invention. Fig. 23 illustrates a sector model of the cerebral vasculature which is utilized by a particular method and system for modeling cerebral blood flow and to which certain of the presently pending claims are directed. Withdrawal of the objections is respectfully requested.

Objection to the Declaration

The examiner has objected to the substitute declaration on the grounds that it does not appear to include a correct listing of the inventors. The objection is traversed as applicants do not believe the objection is proper. The present case, U.S. Patent Application Ser. No. 09/400,365 (referred to herein as the '365 application) is a continuation-in-part of U.S. Patent Application Ser. No. 09/243,870 (referred to herein as the '870 application) which claims priority to U.S. Provisional Patent Application No. 60/073,580 (referred to herein as the '570 application). It is the claims of the instant application that determine what constitutes the correct inventorship entity, notwithstanding any authorship of non-patent literature which might vary

with that entity. Furthermore, all that is required to claim priority from a provisional application is one common inventor between the provisional application and the later filed application. As explained below, however, the pending claims as amended herein include both claims for which priority from the '570 provisional application is claimed and claims for which no priority is presently claimed. Applicants therefore believe the issue is rendered moot.

The University of Illinois is the owner of the present application. CANVAS (Computer Aided Neurovascular Analysis and Simulation) refers to a research group at the University of Illinois. Applicants believe that the inventorship entity is correct and no further information regarding the identities of other members of the CANVAS group is relevant.

Claim for Priority

Applicant believes that claims 1-2, 5-7, 9-13, 15-18, 20-22, and 52-54 as amended herein are entitled to an effective filing date of February 3, 1998 based upon provisional application 60/073,580 to which applicant claims priority. The examiner has objected to this claim for priority, stating that the claims do not have section 112 support in the '870 specification (which is substantially identical to the provisional '570 specification). The objection to the priority claim is traversed. Section 112 support for each of claims 1-2, 5-7, 9-13, 15-18, 20-22, and 52-54 is found in the '870 application at pages 15-19 and at pages 33-36. Similar support is found in the '365 application at pages 34-38 and pages 47-49. The foregoing citations are not intended to be exhaustive, as further support may be provided elsewhere in the two specifications or in the computer code filed with each application.

Rejections Under 35 U.S.C. § 103

Claims 1-2, 10-13, 20, and 22 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Charbel et al., or Kamm et al. (U.S. Patent No. 6,117,087), in view of any of Clark et al. (1989, pp. 217-230), Himwich et al. (1965, pp. 164-172), or Himwich et al. (1974). Claims 5-7 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Charbel et al., or Kamm et al., in view of any of Clark et al. (1989, pp. 217-230), Himwich et al. (1965, pp. 164-172), or Himwich et al. (1974), and further in view of Karplus or Foutrakis. Claims 15-18 and

52 were rejected under 35 U.S.C. 103(a) as being unpatentable over Charbel et al., or Kamm et al. (U.S. Patent No. 6,117,087), in view of any of Clark et al. (1989, pp. 217-230), Himwich et al. (1965, pp. 164-172), or Himwich et al. (1974) and further in view of the Charbel et al. 1997 presentation abstract. Claims 53 and 54 were rejected under 35 U.S.C. 103(a) as being unpatentable over Charbel et al., or Kamm et al. (U.S. Patent No. 6,117,087), in view of any of Clark et al. (1989, pp. 217-230), Himwich et al. (1965, pp. 164-172), or Himwich et al. (1974) and further in view of either Karplus or Ortega. The rejections are respectfully traversed.

As set forth above, claims 1-2, 5-7, 9-13, 15-18, 20-22, and 52-54 as amended herein are entitled to an effective filing date of February 3, 1998. The Kamm et al. patent should therefore be withdrawn as a prior art reference. Applicants therefore believe that the section 103 rejections based upon the Kamm reference have been overcome. Applicants also believe that the Charbel et al. 1997 presentation abstract should be withdrawn as a prior art reference with respect to claims 1-2, 5-7, 9-13, 15-18, 20-22, and 52-54 as it represents the work of one or more of the inventors named herein which was published less than one year before the effective filing date of the claims.

The section 103 rejections were alternatively based upon the Charbel et. al 1994 and 1996 presentation abstracts, referred to herein and in the office action simply as Charbel et. al, as the primary reference. The examiner's position is that, among other things, the Charbel et. al 1996 reference teaches a computerized circulatory system model in which calculated and measured blood flows are used in a "remodeling procedure" which corrects discrepancies observed between the predicted and actual values. As has been stated previously, this is an incorrect interpretation of what was stated in the reference. The Charbel 1996 presentation abstract describes a clinical study in which a computerized model of the cerebral circulation was used to simulate the circulation of 82 patients who underwent a surgical reconstruction. Direct blood flow measurements were performed during the surgeries both before and after the reconstruction, and corresponding blood flows were calculated by the model. Across the 82 patients, there was found to be a linear correlation between the measured blood flows and those predicted by the model, both before and after the surgical reconstruction. This was asserted in the presentation to be evidence of the validity of the computer model. No teaching or suggestion is put forth,

however, for correcting the model in a patient-specific manner based upon a measured flow in an individual patient. In the clinical study, predicted blood flows (i.e., as calculated by the model) in the different patients were found to be correlated with the measured blood flows in the same patients but were not used to correct the computer model. The phrase "vascular remodeling procedures" as used in the presentation abstract refers to surgical reconstructive procedures, and not to a correction of the computer model to account for differences between predicted and measured flows. As evidence of this use of the term "remodeling," applicants submit herewith, as Exhibit A, a declaration of Dr. David Langer. Interpreted correctly, neither the Charbel et. al nor any of the other cited references provide a teaching or suggestion of a method or system for modeling circulation and the effects of a surgical reconstruction in a specific patient in which the model or simulation is corrected based upon calculated and actual measured blood flows from the patient.. Correction of the model in this manner is recited by independent claims 1 and 12 in terms of a method and system, respectively. Applicants therefore respectfully request withdrawal of the obviousness rejections of claims 1 and 12 based upon Charbel et. al as the primary reference. The recitations of dependent claims 2, 5-7, 9-11, 13 15-18, 20-22, and 52-54 are further limitations to the patentable subject matter recited by either claim 1 or 12 are neither taught nor suggested by the prior art of record in that context. Applicant therefore believes all of the rejected claims are allowable over the prior art of record.

New Claims

No claim for priority is presently being asserted for newly added claims 56-65. Those claims relate to, among other things, the sector method of modeling circulation as described on pages 55-60 of the '365 specification. Applicant finds no teaching or suggestion in the cited prior art of a method or system for modeling the circulation of a living subject in which the fluid dynamics of an arterial network are modeled by dividing the arterial network into a plurality of sectors, wherein each sector is terminated by a terminal efferent vessel and has a primary input vessel, and further wherein the terminal efferent vessels are modeled as terminal efferent resistances. Applicant further finds no teaching or suggestion for measuring blood flows in the living subject corresponding to the primary input flows of the sectors and adjusting the terminal

efferent resistances for each sector in a manner which tends to make the calculated flow in the terminal efferent vessel match the measured primary input flow for each such sector.

CONCLUSION

In view of the foregoing amendments and remarks, applicant believes that application is in condition for allowance and respectfully requests such action. Please charge any fees deemed necessary to Deposit Account 19-0743. The examiner is invited to telephone applicant's attorney, J. Kevin Parker, Reg. No. 33,024, at 847-432-7302 to discuss any questions that may remain with respect to the present application.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to MS RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 3, 2004.

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